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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/029,231	12/20/2001	Kazuhiko Otawa	5682-00300	3470

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EXAMINER	
KALAFUT, STEPHEN J	

ART UNIT	PAPER NUMBER
1745	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/029,231	OTAWA ET AL.	
	Examiner	Art Unit	
	Stephen J. Kalafut	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 4-23 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 4-23 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 6/4/02.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Claims 10-15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 10 recites a "molding pressure" range from "100 kg/cm^2 to 100 kg/cm^2", as if a single value may be the entire range. Claims 11-15 depend from claim 10 and would likewise be indefinite.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 4-6, 8, 10-12 and 15 are rejected under 35 U.S.C. 102(b) as being anticipated by Emanuelson *et al.* (US 3,755,243).

Emanuelson *et al.* disclose a molding process for making a fuel cell separator plate, from graphite and phenolic resin (column 2, lines 1-30). The resin constitutes from 5 to 25 weight percent of the plate, preferably 20 percent (column 4, lines 13-17). The graphite and resin are first pressed at a low temperature and pressure which would soften the resin and allow it to coat the graphite, and then pressed at a temperature of 300 to 400 °F (148 to 204 °C) and a pressure of at least 2,500 psi (180 kg/cm^2), these values falling in or overlapping the present ranges. See column 3, line 42 through column 4, line 6. While Emanuelson *et al.* do not disclose coating the

graphite with resin before it is placed in the mold, claims 4-6 are in product-by-process format. No differences in the final product structure are seen to arise from when the two components are first brought into contact. Since the proportions of the materials of Emanuelson *et al.* fall within the present range, the properties recited by claim 5 would also accrue. Since the graphite and resin are two solid phrases, the resin would occupy the gaps between graphite particles, as recited in claims 8 and 15. Since most of the graphite particles are between 60 and 160 microns in diameter (Table I), the average diameter would be around 100 to 120 microns.

Claims 16-20 and 23 are rejected under 35 U.S.C. 102(e) as being anticipated by Mizuno (US 2002/0004156).

Mizuno discloses a fuel cell stack (14) comprising unit cells (28), each with an anode (22), a cathode (23) and a solid polymer film (21) between them, and comprising separators (30a, 30b) between the unit cells. The separators are made of graphite (section 0048) and phenolic resin, the resin constituting between 8 and 16 weight percent of the separator (sections 0047 and 0068). The separator is made by a molding process (figure 2A) and includes gas passages on both sides, one reactant on each side (figure 2B). Since the graphite and resin are two solid phrases, the resin would occupy the gaps between graphite particles, as recited in claim 18. The recited limit of 15 percent resin (section 0068) would fall into the range of claim 23.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 7 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Emanuelson *et al.*, above.

Emanuelson *et al.* do not specifically mention that the resin is present the range of 14-18 weight percent. However, this range falls within the disclosed range of 5 to 25 weight percent. Since amounts of components would have an effect on electric conductivity (graphite) and mechanical strength (resin), their proportions would be a result-effective variable. Emanuelson *et al.* also teach that the thickness of the plate may vary (column 4, lines 3-6). Because separator thickness would have an effect on the mechanical strength of the fuel cell stack and its overall size, it would also be recognized as a result-effective variable. Optimization of these variables would thus be within the skill of the ordinary artisan. For this reason, these claims would be obvious over Emanuelson *et al.*

Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mizuno in view of either Shigeta *et al.* (US 4,664,988) or Hand *et al.* (US 2002/0064701).

Mizuno does not disclose coolant passages within his separator. Shigeta *et al.* disclose a fuel cell separator (13) having internal coolant passages (14). Hand *et al.* teach that a fuel cell separator "bipolar plate" generally has both gas passages on its surface, and internal coolant passages (section 0051). It would be obvious to modify the separator of Mizuno to include internal coolant passages, as taught by either Shigeta *et al.* or Hand *et al.*, to provide the cooling which the fuel cell of Mizuno would need, since all fuel cells produce heat, and because a single

component would be able to perform both the functions of cooling and electrical connection between individual cells.

Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mizuno in view of Emanuelson *et al.*

Mizuno does not disclose any particular thickness for his fuel cell separator. Emanuelson *et al.* teach that the thickness of the plate may vary (column 4, lines 3-6). Because separator thickness would have an effect on the mechanical strength of the fuel cell stack and its overall size, it would be recognized as a result-effective variable. For this reason, it would be obvious to vary the thickness of the separator of Mizuno as taught by Emanuelson *et al.*, and to find an optimal value therefor.

Claims 13 and 14 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims. The actual coating of the graphite with resin before they are molded, as implied by claim 13, and the process of mixing graphite with a solution of the resin are not disclosed by the prior art.

The disclosure is objected to because of the following informalities: The numeral 20 does not appear in figure 1, as recited in the specification, on page 12, bottom paragraph. Appropriate correction is required.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Takano *et al.* (US 6,544,680) and Bisaria *et al.* (US 6,379,795) disclose fuel cell separators and methods of making them.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen J. Kalafut whose telephone number is 571-272-1286. The examiner can normally be reached on Mon-Fri 8:00 am-4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

sjk

STEPHEN KALAFUT
PRIMARY EXAMINER
GROUP 1700